

FIG. 1

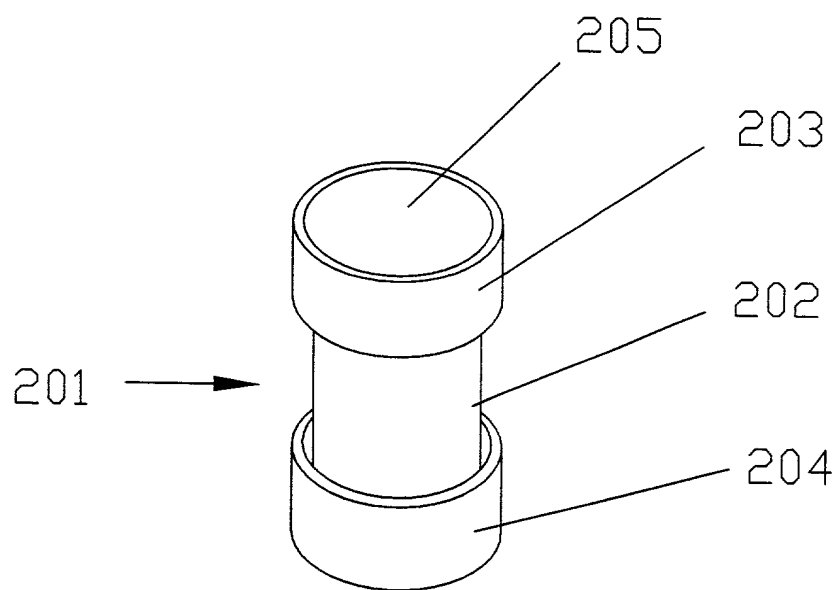


FIG. 2

FIG. 3

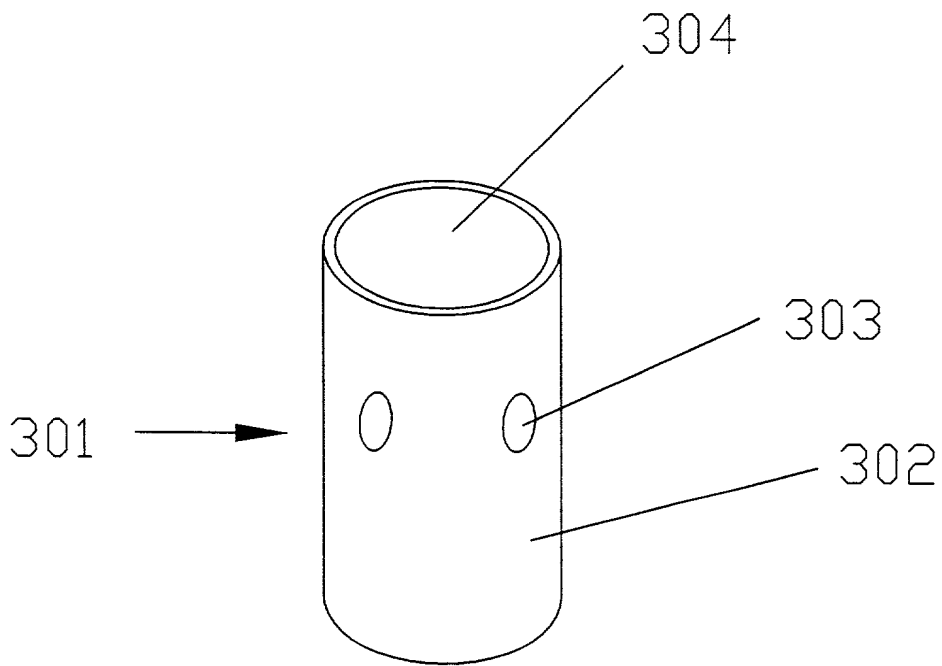


FIG. 3

FIG. 4

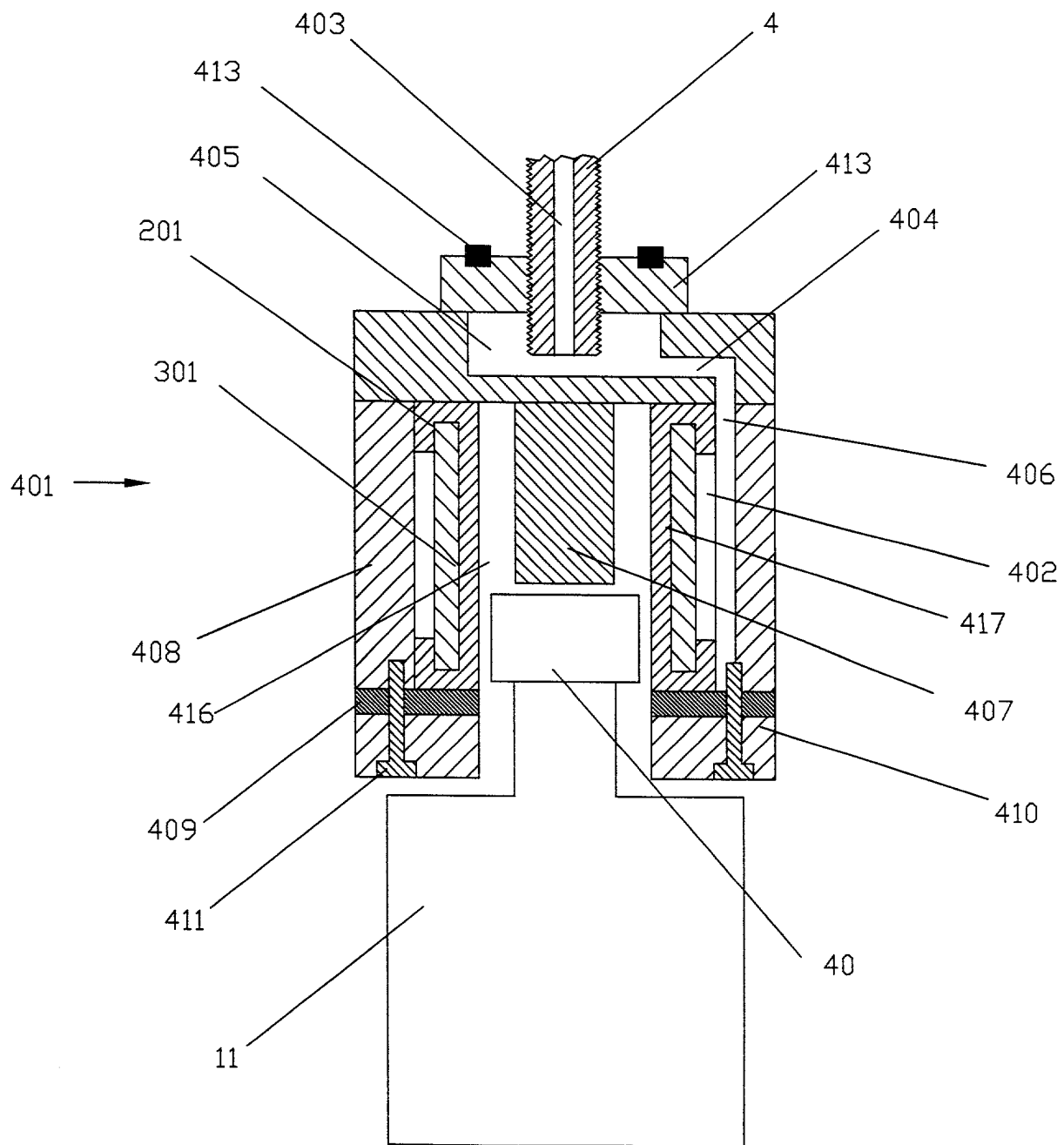


FIG. 4

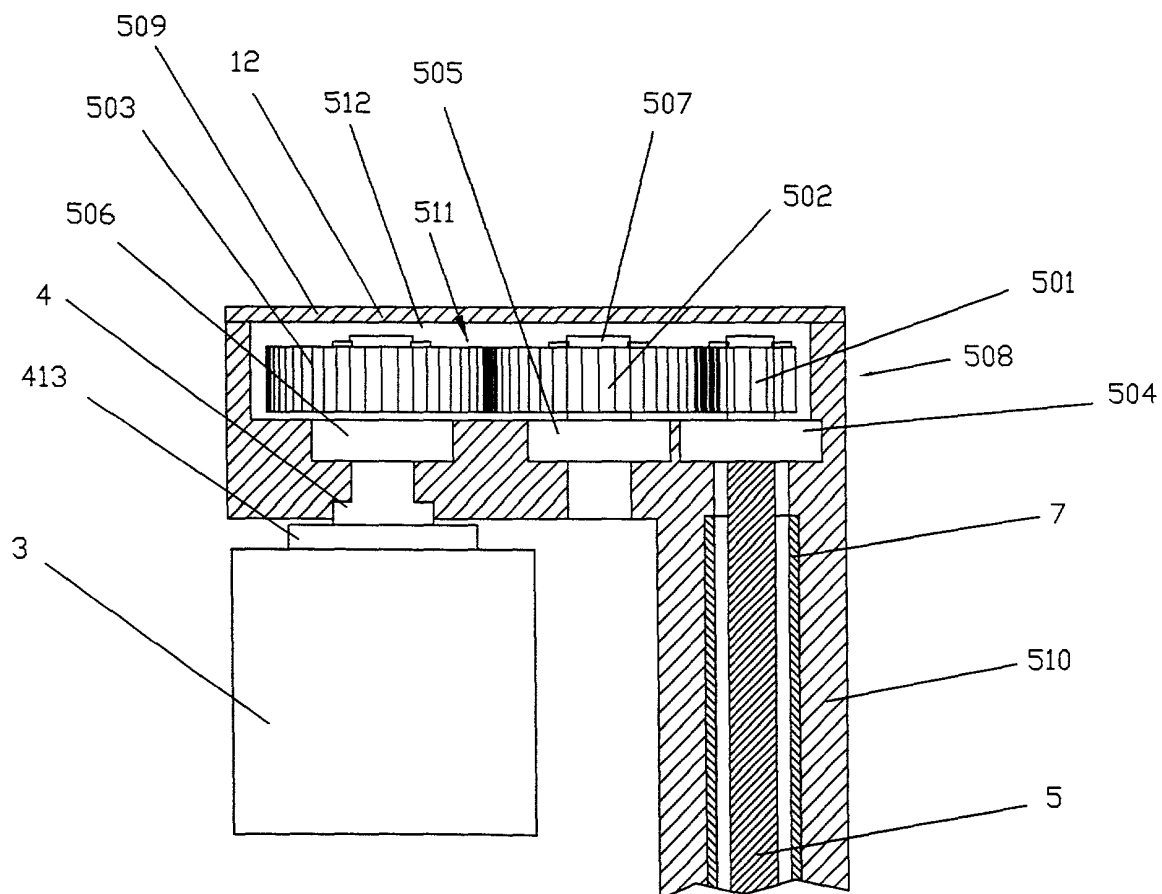


FIG. 5

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CITY OF BOSTON
1850



FIG. 7A

FIG. 7B'

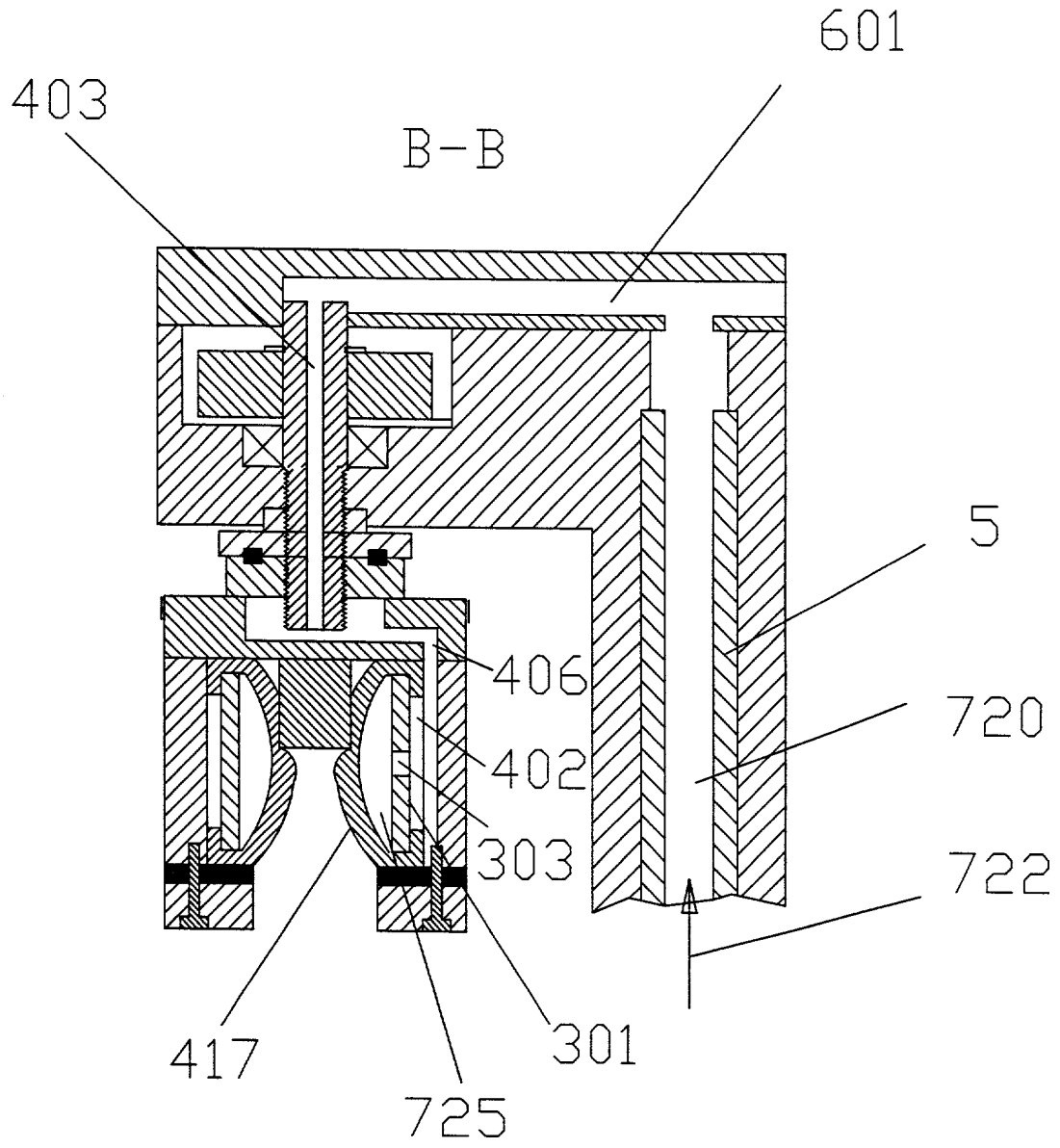


FIG. 7B'

FIG. 7B

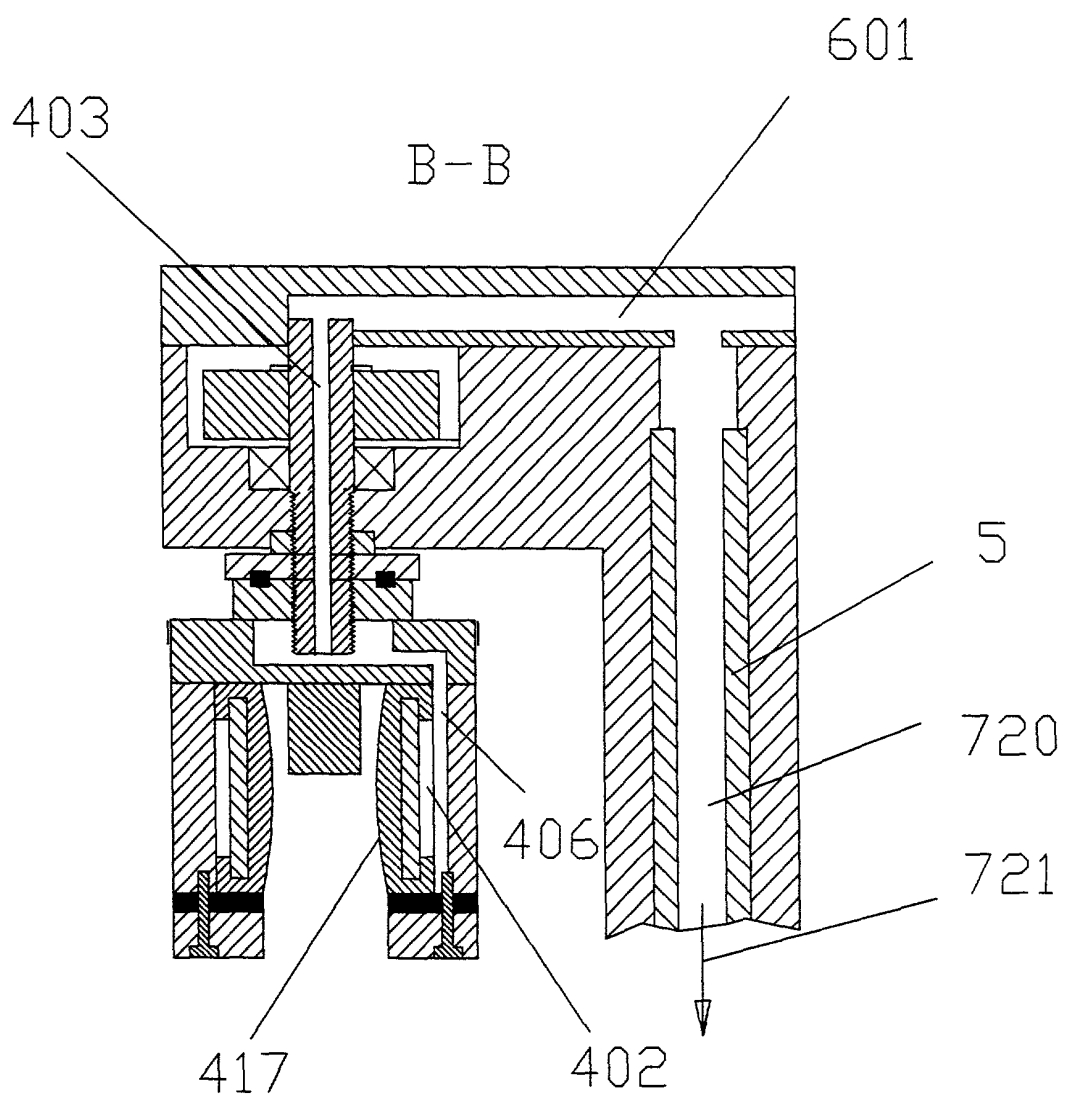


FIG. 7B

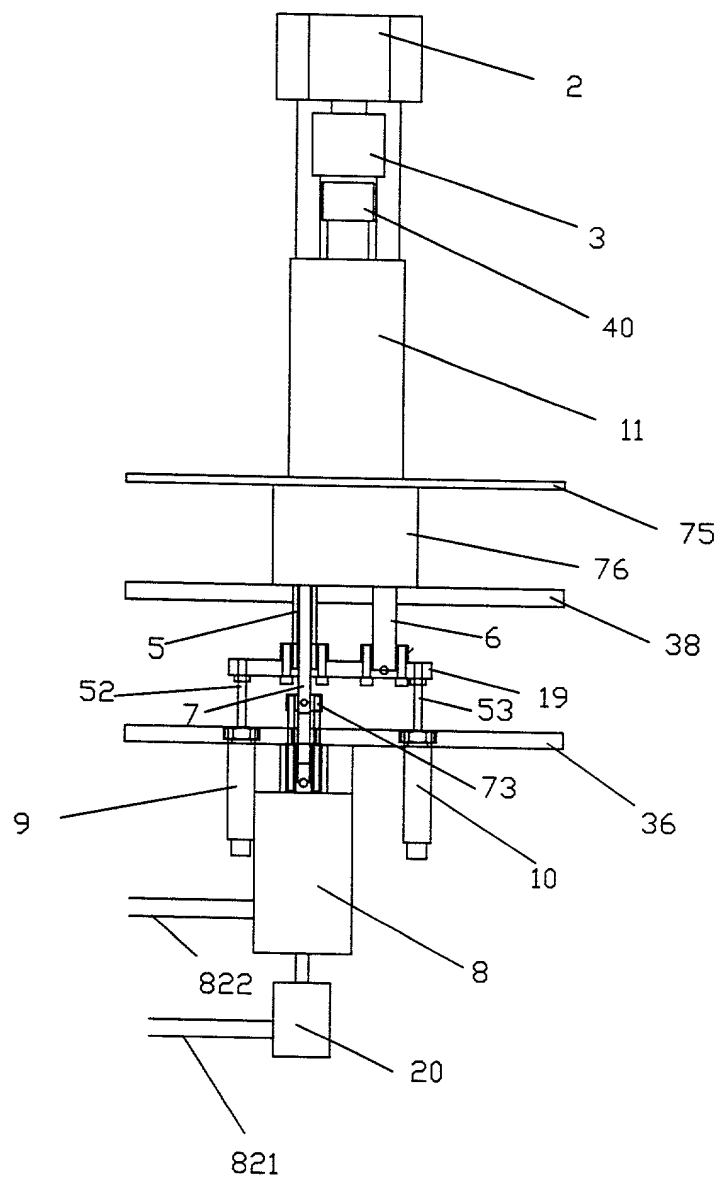


FIG. 8A

FIG. 8B

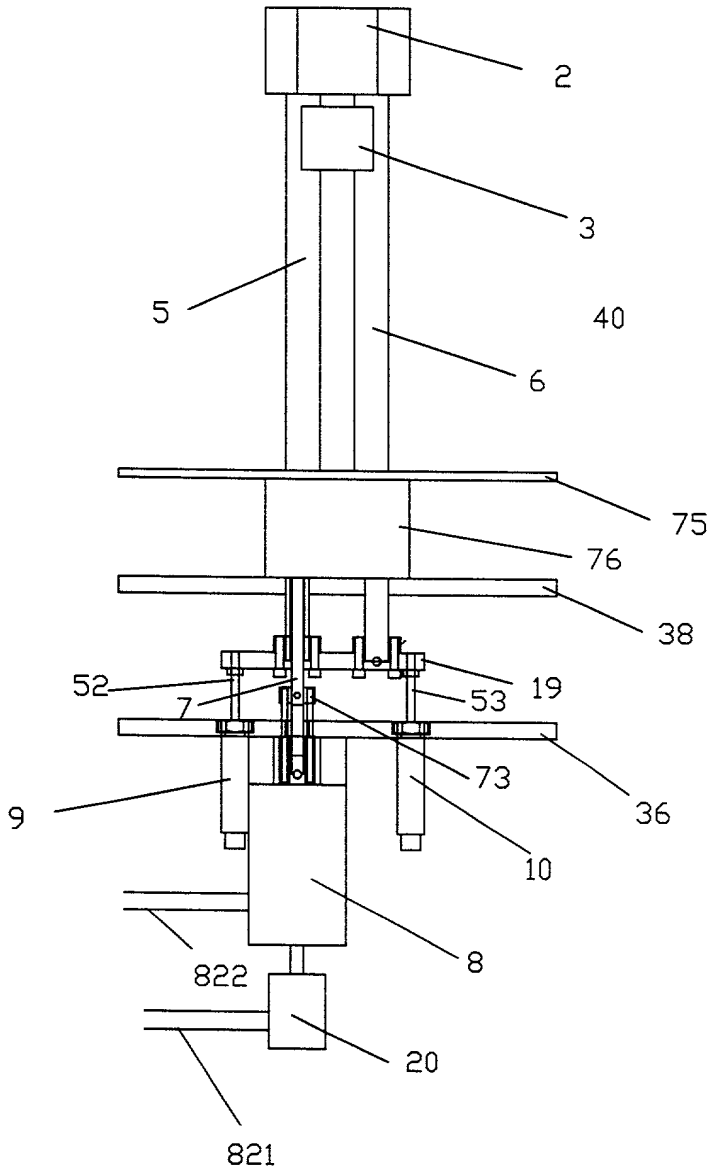


FIG. 8C

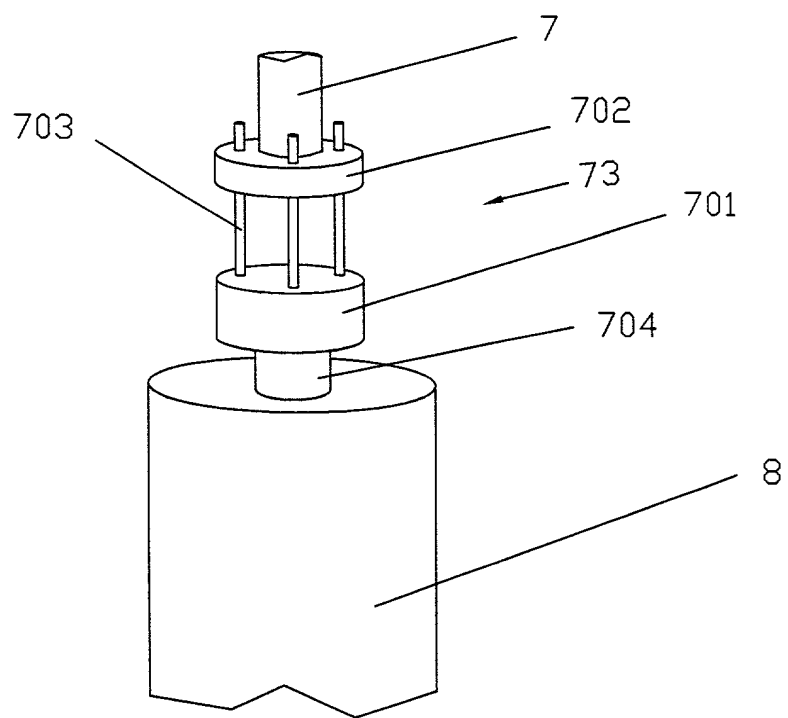


FIG. 9

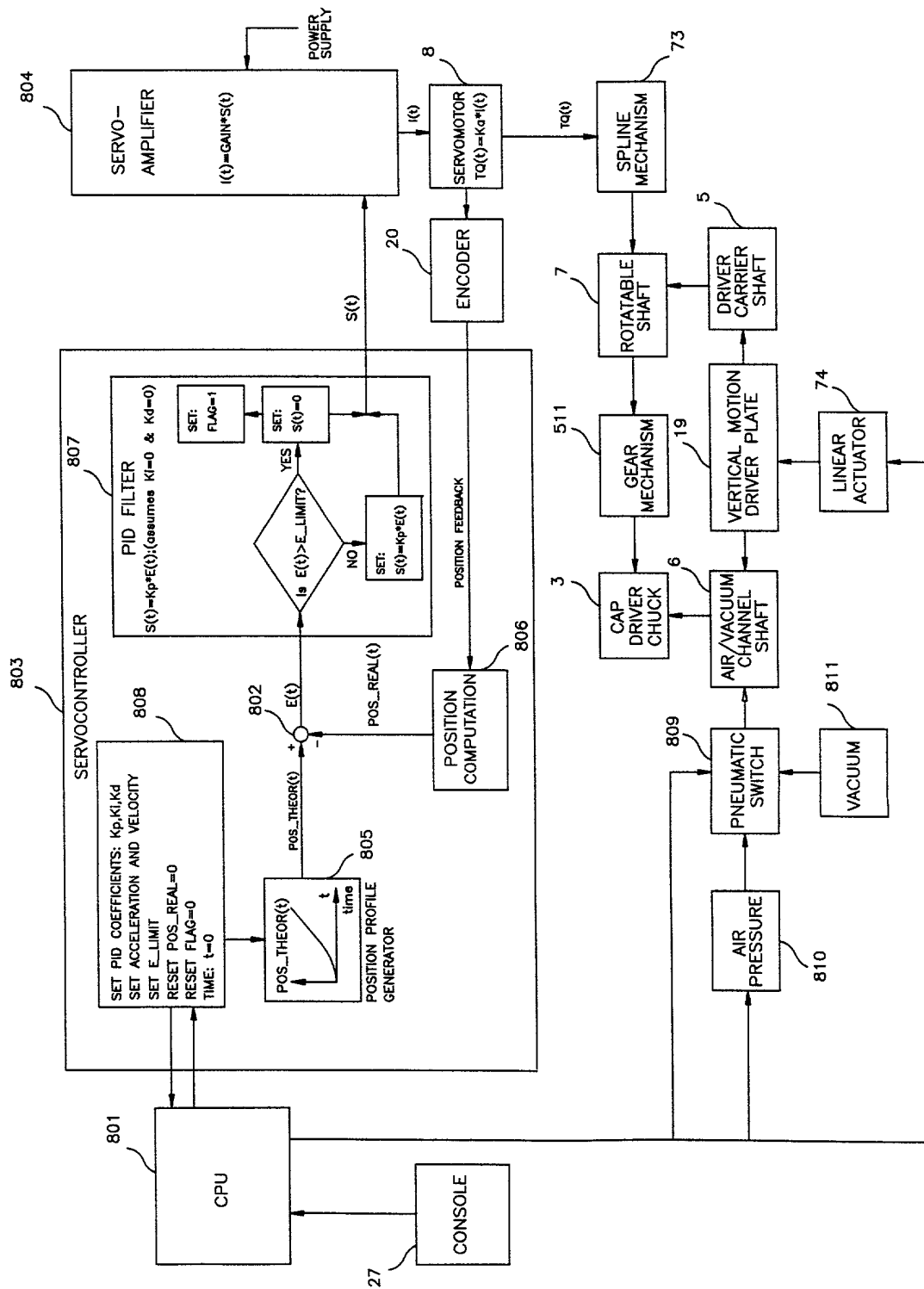
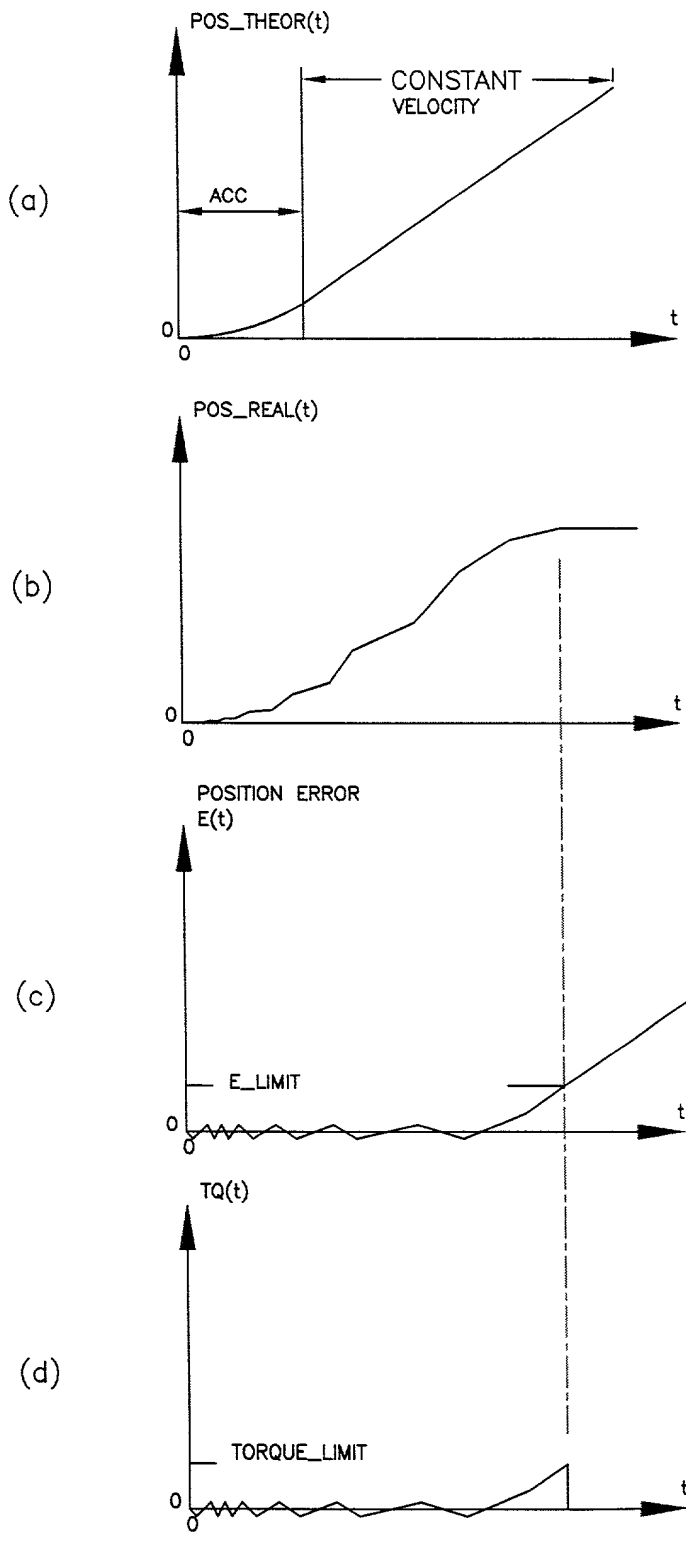


FIG. 10



DURING THIS TIME:
PLACING CAP ON THE CONTAINER PRIOR TORQUING POSITION
(OPTIONAL FILLING AND/OR STOPPING CONTAINERS
ON PRIOR POSITIONS)

MOVE IN NEW/REMOVE OLD CONTAINER t=0

(STAR-WHEEL BOTTLE INDEX) t=1

CAP DRIVER CHUCK UP t=1

CAP DRIVER CHUCK DOWN t=7

(ELECTROVALVE)

AIR PRESSURE/VACUUM TO ACTIVATE/RELEASE GRIPPER t=2

(ELECTROVALVE)

CHUCK ROTATE t=3

(SERVOMOTOR)

TORQUE LIMIT REACHED: $E(t) > E_LIMIT$? t=4

(SERVO-CONTROLLER)

CONTAINER HOLDER t=1

CONTAINER CLAMPING MECHANISM t=8

RELEASED

ACTIVATED: HOLD CONTAINER IN PLACE


VACUUM (RELEASE CAP) t=6

CHUCK UP t=0

RELEASE CONTAINER

NEXT CYCLE

time t

time t 

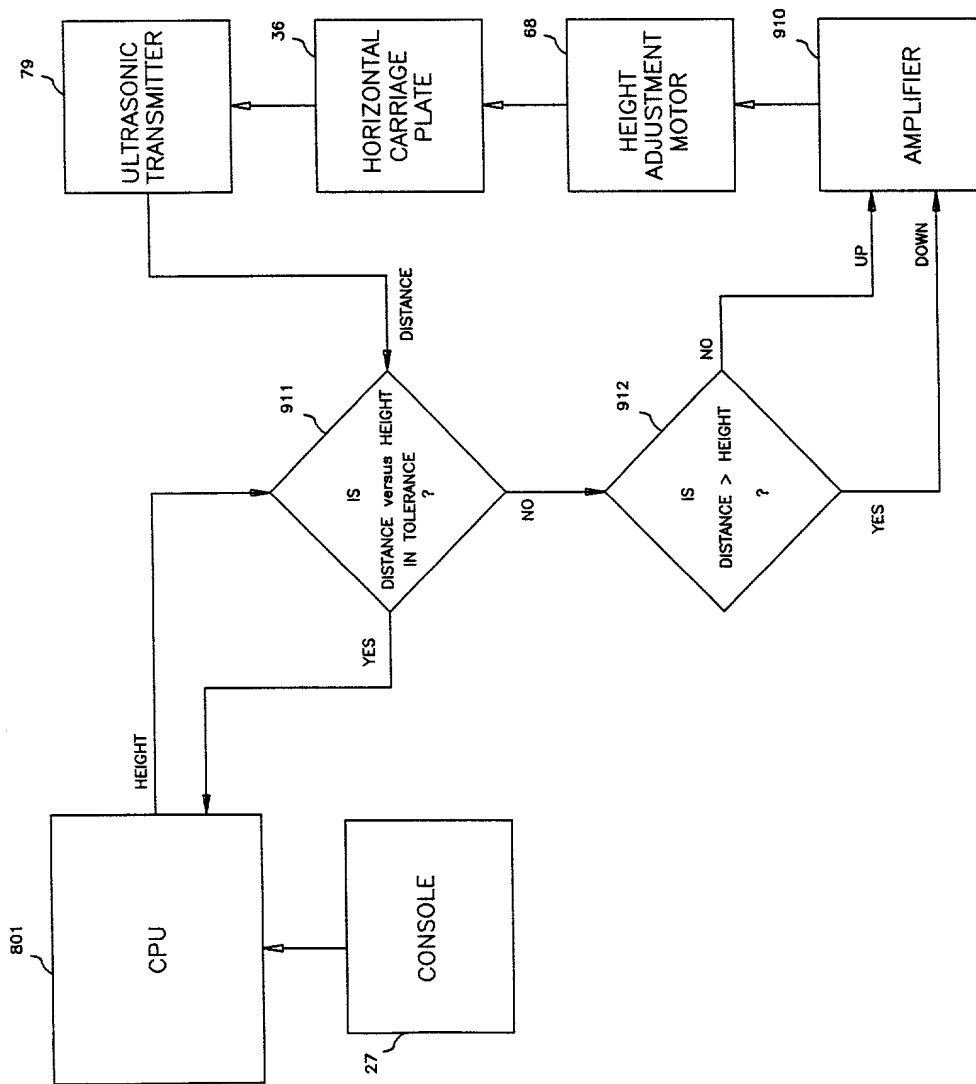


FIG. 13

FIG. 14

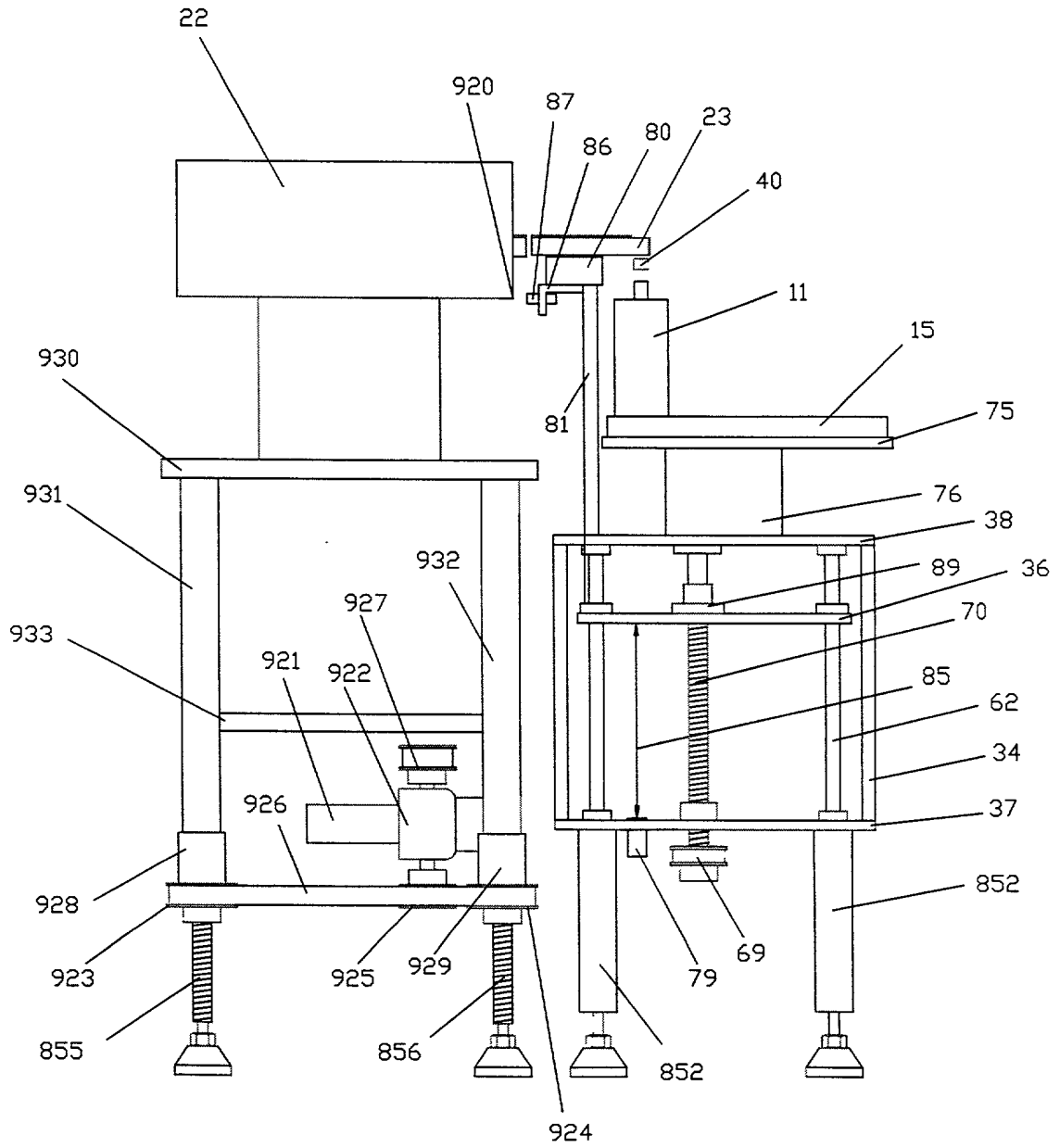


FIG. 14

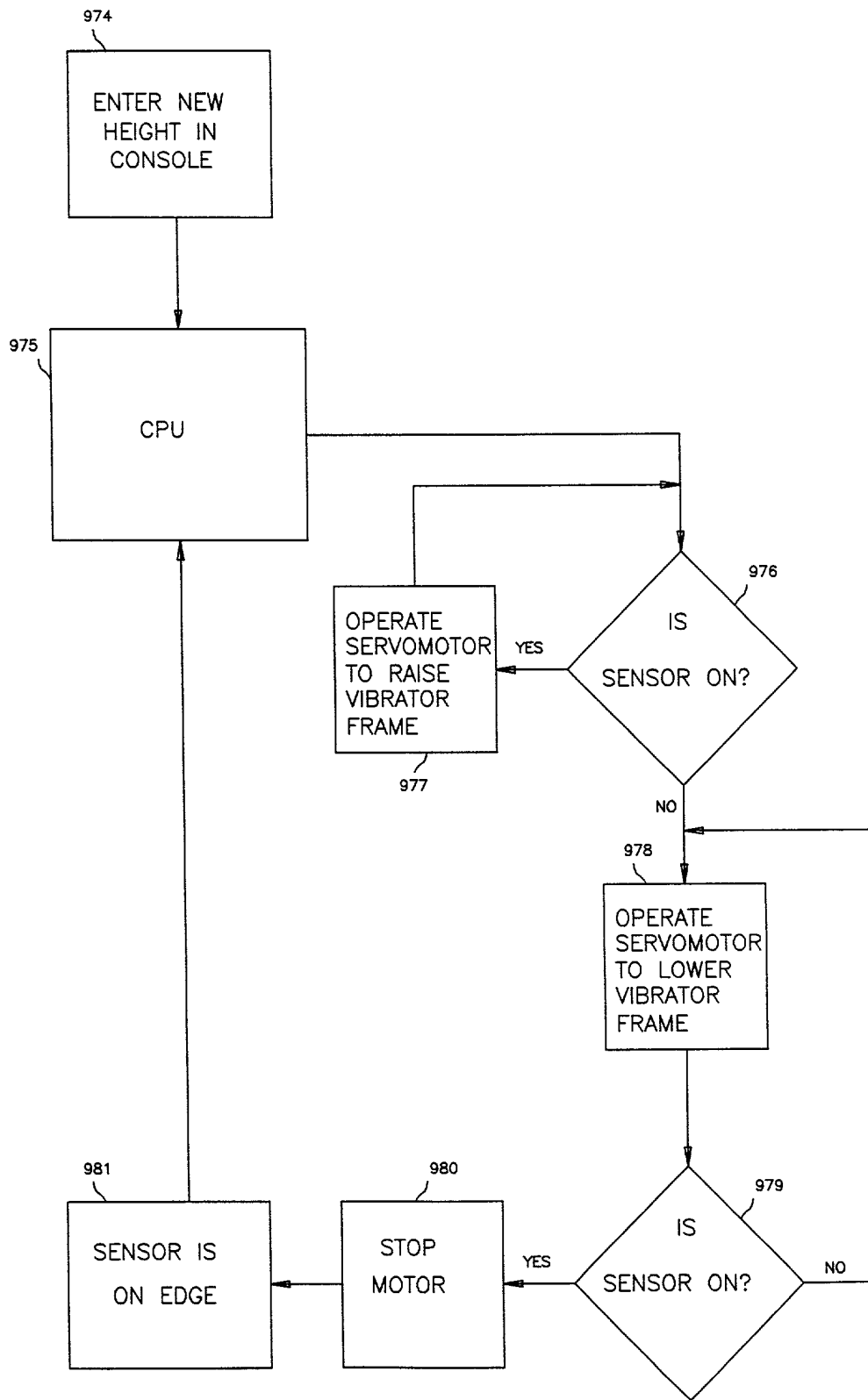


FIG. 15